

CLAIMS

1. An aqueous coating composition with an improved open time comprising:
- a) 1 to 35 wt % of a crosslinkable water-dispersible oligomer(s);
- b) 4 to 50 wt % of a dispersed polymer(s);
- c) 3 to 75 wt % of a pigment(s) with an oil absorption number  $\leq 25$ g oil / 100g pigment;
- d) 0 to 10 wt % of a Newtonian-like thickener(s);
- e) 0 to 10 wt % of a thixotropic thickener(s);
- f) 0 to 20 wt % of co-solvent;
- g) 10 to 80 wt % of water;
- where a) + b) + c) + d) + e) + f) + g) = 100%;
- wherein the weight ratio of a) : b) is in the range of from 10:90 to 60:40; wherein d) + e) = 0.1 to 10 wt % and wherein said composition when drying to form a coating has a tack-free time of  $\leq 24$  hours.
2. An aqueous composition according to any one of the preceding claims wherein the crosslinkable oligomer(s) is a self-crosslinkable oligomer(s).
3. An aqueous composition according to any one of the preceding claims wherein the crosslinkable oligomer(s) is selected from a group consisting of polyurethane oligomer(s), vinyl oligomer(s), polyamide oligomer(s), polyether oligomer(s), polysiloxane oligomer(s), polyester oligomer(s), hyperbranched oligomer(s) and/or mixtures thereof.
4. An aqueous composition according to any one of the preceding claims wherein the crosslinkable oligomer(s) has an acid value in the range of from 0 to 80 mg KOH/g.
5. An aqueous composition according to any one of the preceding claims wherein the crosslinkable oligomer(s) has a measured weight average molecular weight in the range of from 1,000 to 100,000 Daltons.
6. An aqueous composition according to any one of the preceding claims wherein the crosslinkable oligomer(s) is less than 70% by weight soluble in water throughout a pH range of from 2 to 10.
7. An aqueous composition according to any one of the preceding claims wherein the crosslinkable oligomer(s) has a measured Tg in the range of from  $-120$  to  $250^{\circ}\text{C}$ .

8. An aqueous composition according to any one of the preceding claims wherein the dispersed polymer(s) has a measured weight average molecular weight  $\geq 110,000$  Daltons.

5 9. An aqueous composition according to any one of the preceding claims wherein the dispersed polymer(s) has an average particle size in the range of from 25 to 1000 nm.

10. An aqueous composition according to any one of the preceding claims wherein the dispersed polymer(s) has a measured Tg in the range of from  $-50$  to  $300^{\circ}\text{C}$ .

10 11. An aqueous composition according to any one of the preceding claims wherein the dispersed polymer(s) is a vinyl polymer.

15 12. An aqueous composition according to claim 11 wherein the dispersed vinyl polymer has 10 to 50 wt % of a soft part with a measured Tg in the range of from  $-30$  to  $20^{\circ}\text{C}$  and 50 to 90 wt % of a hard part with a measured Tg in the range of from 60 to  $110^{\circ}\text{C}$ .

20 13. An aqueous composition according to any one of claims 11 or 12 wherein the dispersed vinyl polymer(s) comprises:

I. 15 to 80 wt % of styrene and/or  $\alpha$ -methylstyrene;

II. 0 to 50 wt % of one or more of methyl (meth)acrylate, ethyl (meth)acrylate, cyclohexyl (meth)acrylate and n-butyl (meth)acrylate;

III. 0 to 7 wt % of a vinyl monomer(s) containing a carboxylic acid group(s);

25 IV. 0 to 10 wt % of a vinyl monomer(s) containing a non-ionic water-dispersing group(s);

V. 5 to 40 wt % of a vinyl monomer(s) other than as in I to IV, VI and VII;

VI. 0 to 5 wt % of a vinyl monomer(s) containing wet adhesion promoter or crosslinker groups (excluding any within the scope of III and VII); and

30 VII. 0 to 8 wt % of a polyethylenically unsaturated vinyl monomer,  
wherein I) + II) add up to at least 50% and I + II+ III+ IV + V + VI + VII add up to 100%.

14. An aqueous composition according to any one of the preceding claims wherein the pigment volume concentration is in the range of from 1 to 48 wt %.

35 15. An aqueous composition according to any one of the preceding claims wherein the pigment(s) has a water absorption number  $\leq 40 \text{ cm}^3 / 100\text{g pigment}$ .

16. An aqueous composition according to any one of the preceding claims wherein the composition comprises 0.1 to 10 wt% of d) the Newtonian-like thickener.

17. An aqueous composition according to any one of the preceding claims wherein the composition comprises 0.1 to 10 wt% of e) the thixotropic thickener.

18. An aqueous composition according to any one of the preceding claims wherein the ratio of Newtonian-like to thixotropic thickener is in the range of from 95:5 to 30:70.

19. An aqueous composition according to any one of the preceding claims wherein the co-solvent to water ratio is below 0.8.

20. An aqueous composition according to any one of the preceding claims wherein the improved open time is at least 3 minutes longer than a reference formulation.

21. An aqueous composition according to any one of the preceding claims wherein the open time is at least 9 minutes.

22. An aqueous composition according to any one of the preceding claims wherein said composition has an equilibrium viscosity  $\leq 500$  Pa.s, during the first 10 minutes of drying when measured using any shear rate in the range of from  $0.01 \pm 0.005$  to  $900 \pm 5$  s<sup>-1</sup> and at 23 +/- 2°C.

23. An aqueous composition according to any one of the preceding claims wherein the shear ratio of the composition is in the range of from 1 to 20 at a shear rate of 10 s<sup>-1</sup> and 1,000 s<sup>-1</sup>.

24. A coating obtainable from an aqueous composition according to any one of the preceding claims.

25. A method for coating a substrate using an aqueous composition according to any one of claims 1 to 23.

26. A substrate coated with an aqueous composition according to any one of claims 1 to 23.